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DEVELOPING FACILITY INFORMATION FOR COMBAT EQUIPMENT GROUP -- E--ETC(U)  
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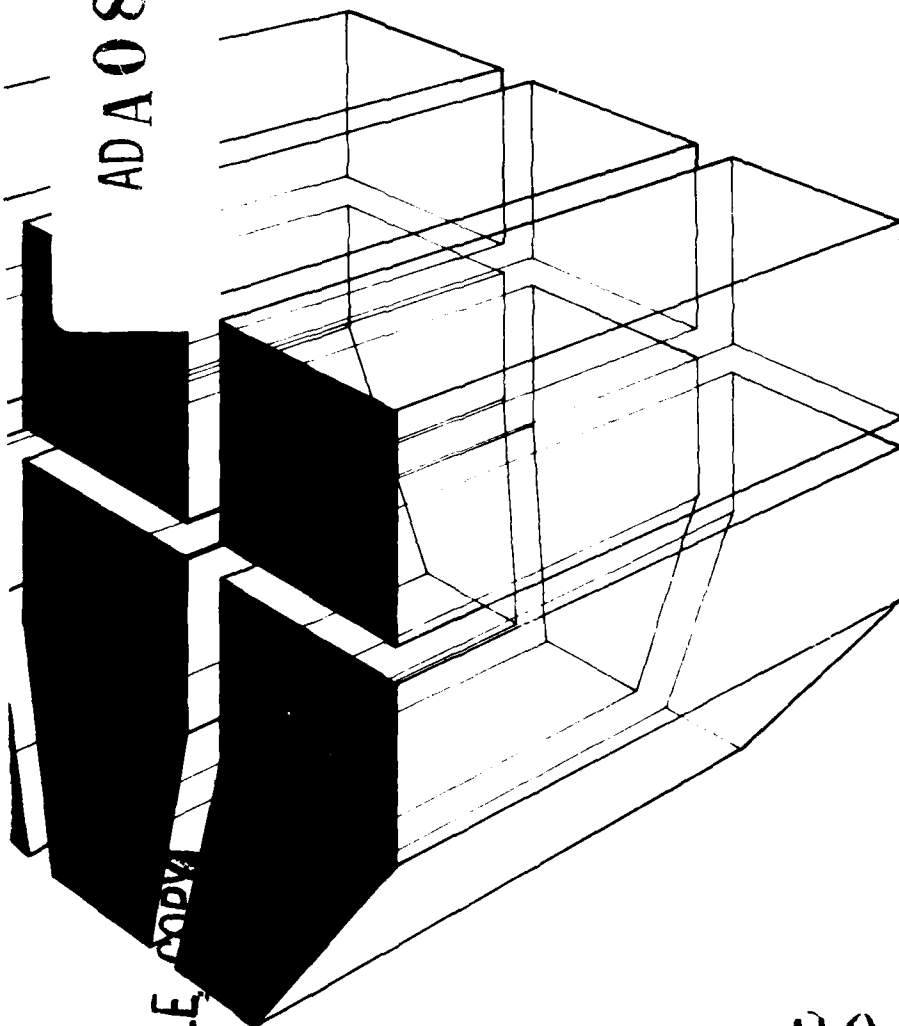


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TECHNICAL REPORT E-165  
May 1980

DEVELOPING FACILITY INFORMATION FOR  
COMBAT EQUIPMENT GROUP-EUROPE (CEGE) SITES

AD A 084217



by  
Robert Porter



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Block 20 continued.

improve POMCUS system facilities, and (3) specific space and work station information from regulation documents and current CEGE facility occupants. The information document developed is entitled, *Type II Forward Storage Site Facilities -- POMCUS System* (September 1979).

UNCLASSIFIED

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## FOREWORD

This investigation was performed for the Directorate of Military Programs, Office of the Chief of Engineers (OCE), under Project 4A762731AT41, "Military Facilities and Engineering Technology," Task F, "Base Development/Combat Engineering Construction," Work Unit 006, "Functional Requirements for Design of POMCUS Storage Sites." The OCE Technical Monitor was LTC(P) Paul J. Theuer, DAEN-MPZ-U.

The work was performed by the Energy and Habitability Division (EH), U.S. Army Construction Engineering Research Laboratory (CERL). The personnel performing the work on this project were Robert Porter (Principal Investigator), David Dressel, Martin Koch, Charles Lozar, and Robert Doerr.

Mr. R. G. Donaghy is Chief of EH. COL Louis J. Circeo is Commander and Director of CERL, and Dr. L. R. Shaffer is Technical Director.

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# **DEVELOPING FACILITY INFORMATION FOR COMBAT EQUIPMENT GROUP - EUROPE (CEGE) SITES**

## **1 INTRODUCTION**

### **Background**

The U.S. Army's role in the defense of Western Europe requires the rapid reinforcement of NATO force ground combat units if enemy forces initiate hostilities. The combat-trained troops who comprise these replacement units are stationed at various Continental United States (CONUS) home stations, such as Fort Riley, KS. However, their combat equipment is stored and maintained in a ready-for-issue condition in the Federal Republic of Germany (FRG) at Combat Equipment Group - Europe (CEGE) sites.

To facilitate the rapid deployment of the replacement units, the stored equipment and supplies are located at the CEGE sites in groupings specifically related to the military components, officially identified as POMCUS (Prepositioned Materiel Configured to Unit Sets). The CEGE site is the essential POMCUS physical facility and is made up of 20 to 30 buildings, vehicle parking areas, and a utility/roadway system. Annual Return of Forces to Germany (REFORGER) military exercises have been carried out to increase the operational capabilities of the combat units and to evaluate the CEGE installation layout and facilities.

### **Problem**

Currently, seven CEGE sites in the FRG are fully operational. Three additional sites are being developed for occupancy during FY80. Recent strategy evaluations, however, have revealed that existing CEGE/POMCUS installations and their facilities are potentially vulnerable to enemy attack.

### **Objective**

The objective of this work was to generate comprehensive, generic information for the design and construction of future CEGE installations, with specific attention to:

1. The particular facility requirements of CEGE installation user/occupants in accomplishing the storage, maintenance, and issue functions
2. The military threats and vulnerabilities
3. The NATO construction funding justification provisions
4. The lessons learned from the daily operations and REFORGER exercises occurring on the existing CEGE sites.

### **Approach**

Current, comprehensive, generic design information was systematically collected for the various military components assigned to CEGE installations. The numerous facility types at a CEGE installation (e.g., storage and maintenance) were identified so that the users and administrators of CEGE operations could input design information appropriately categorized for the research and planning teams using the information. Command personnel reviewed the information and forecasted the possible future POMCUS operational changes that could impact CEGE site functions, and therefore the facilities.

### **Users of the CEGE Facility Information**

The following users of this information have been identified:

1. Future CEGE site-planning cells of the 21st Support Command (SUPCOM) dealing with development of a Project Summary and a Project Development Brochure (PDB) for future CEGE projects.

2. U.S. Army, Europe (USAREUR) 21st SUPCOM and CEGE personnel dealing with training or familiarization programs for new personnel assigned to the POMCUS operations.

3. CERL research teams dealing with:

- a. Environmental constraints of CEGE sites
- b. CEGE site layout design
- c. Camouflage of CEGE sites
- d. Ammunition storage facilities
- e. Life-cycle cost optimization of CEGE sites
- f. Controlled humidity storage facilities
- g. General-purpose warehousing facilities
- h. Weapon blast loading criteria for storage structures
- i. Chemical/biological warfare facility implications
- j. Decontamination of CEGE personnel and equipment.

4. Host Country Ministries of Defense/Construction in Federal Republic of Germany, Netherlands, and Belgium:

- a. Regarding future POMCUS sites in Europe.
- b. This construction to be conducted in accordance with information provided in paragraphs 1 and 3 above, such as project development brochures and research reports.

### Mode of Technology Transfer

The information developed from this research will be provided to planners and designers in a design information document entitled *Type II Forward Storage Site Facilities - POMCUS System*.

## 2 CEGE FACILITY PROBLEMS AND UNCERTAINTIES

Analysis of the initial review of CEGE facilities currently in Central Germany (CENTAG) revealed a list of problems and uncertainties that are of concern to personnel responsible for POMCUS system readiness. Persons interviewed were assigned to the following U.S. Army groups:

### 1. USAREUR:

- a. Logistics
- b. Operations
- c. War Reserve

### 2. 21st SUPCOM:

- a. Assistant Chief of Staff, Engineering and Housing
- b. Northern Army Group (NORTHAG) Planning Cell

### 3. CEGE - Europe:

- a. Headquarters
- b. First Company

4. Engineer Division, Europe (EUD), Corps of Engineers, Frankfurt: EUD -- POMCUS Project Manager

The problems noted appeared to fall into six categories:

1. Site design and site location of CEGE installations:

- a. It is difficult or impossible to obtain optimum parcels of land with enough contiguous acreage located appropriately for military strategy.
- b. All necessary items (especially ammunition and petroleum, oils, and lubricants [POL]) are not available at each site to the extent that they are needed because of host nation agreement restrictions.
- c. CEGE sites lack adequate adjacent area and transportation routes for incoming CONUS troops.

2. Storage and mobilization issue effectiveness vs. scheduled maintenance efficiencies:

- a. Facilities are not capable of providing total "ready-for-issue," one-stop service.
- b. The appropriate mobilization issue time is unclear. Different issue process times require different storage configurations.
- c. Currently there are evaluation studies under way at USAREUR to determine whether batteries, fuel, tools, and other materiel will be uploaded or downloaded on vehicles. Uploading imposes greater time and personnel demands on scheduled maintenance operations, whereas downloading increases the number of mobilization issue steps.
- d. A means of keeping incoming troop units separate and distinct during the issue process is necessary.

- e. Since the personnel in a Company are essentially maintaining a Division's amount of equipment, the maintenance facilities must be much more efficient.

3. Site operation considerations:

- a. Future, remote sites will be contractor-operated with personnel support obtained from surrounding communities. For noncontractor operations, more life support facilities must be provided at the sites; most of these services are now provided by the larger, military base command.
- b. Training new personnel in CEGE site operations is difficult, since policies (e.g., uploading vs. downloading) seem to fluctuate cyclically.
- c. There are equipment changes every year, which may cause the number and size of the items to change. Tailoring the facilities too specifically may constrain them in the future, e.g., there could be too much or too little Controlled Humidity Warehouse (CHW) space or maintenance bays. Therefore, efficient operations require more adaptable facilities.

4. Mobilization capabilities:

- a. The appropriate size of a military unit set for storage at one location is not clear. For example, if an entire Brigade (with a headquarters, combat battalions, and combat service support units) was located at a single site, all components could move away from the CEGE installation as a fighting unit.
- b. Each vehicle leaving a CEGE site may have to be combat-ready, since the marshalling areas may not be available. Therefore, the current one-fourth-full fuel tank guidance for all vehicles may be inadequate if there are major travel distances to the marshalling areas.

5. CEGE facility costs and funding sources:

- a. The U.S. Congress has stipulated that all future CEGE site construction funding beyond the current three sites will not be provided by U.S. appropriations including the prohibition to prefinance NATO eligible construction items, unless otherwise excepted.
- b. Installation layouts and their buildings do not maximize their potential efficiencies for long-term energy conservation and manpower effectiveness for activities related to storage, maintenance, and issue functions.
- c. Controlled-humidity storage building floor areas and enclosed volume are not being used efficiently.
- d. Standardized plans should be used; for example, there are currently similar 12-, 16-, and 20-bay maintenance buildings, and it is too expensive to design each site differently.

6. Military vulnerability of CEGE facilities:

- a. Site layouts do not minimize the effects of enemy air strikes and conventional artillery weapons, although thermal and direct visual camouflage techniques that can be applied to reduce the target vulnerability are being developed.
- b. Building construction cannot withstand indirect conventional artillery weapons, nuclear blast overpressure, or persistent chemical droplets and mists.

The problems and uncertainties listed above were considered too extensive and continuing (i.e., they could not all be resolved simultaneously by a single authority) to allow a *definitive* documentation of CEGE facility functional requirements at this time. Instead, it was determined that these problems and uncertainties required a comprehensive collection of integrated information from diverse sources that could be used to

plan, program, and design CEGE facilities. In addition, since the information originated from diverse sources, it probably contained conflicting statements that would require resolution during a specific project's design decision-making. Chapters 3 and 4, respectively, discuss sources of comprehensive information and the best format for presenting it.

### 3 SOURCES OF CEGE FACILITY INFORMATION

Researchers investigated the appropriate sources of relevant data in order to be most responsive to the CEGE facility information needs of research teams and NORTHAG planning cells. The problems and uncertainties listed in Chapter 2 generated an awareness of the evolving character of both the POMCUS program and the facilities that have been developed at CEGE installations during the previous 9 years. Major issues concerning the basic storage, maintenance, and mobilization issue operations seemed to potentially impact the planning and design of the entire CEGE site and the individual facilities. The information discussed in this chapter was collected to allow optimum decisions about specific future CEGE facility development projects.

Three sources of facility-related information were determined to be relevant to the decision-making process:

1. Data on POMCUS-related supplies and equipment that are stored and maintained at CEGE installations.
2. Literature extracts from Army Technical Manuals (TMs), Army Regulations (ARs), research studies, Command letters, Congressional background papers, and *Army Logistician* articles.
3. User experience information obtained from USAREUR, 21st SUPCOM, CEGE, and EUD personnel.

## Supplies and Equipment Data

Supplies and equipment are received, stored, maintained, and issued for a designated mix of military units, both divisional and non-divisional. Each military unit requires different quantities of various operational items for its own unique military mission. A portion of each unit's total supply and equipment inventory has been designated as relevant to POMCUS system facilities -- the inventory that is received, stored, maintained, and issued at a CEGE installation. Currently, only items from Class IV (barrier and construction materials), Class VII (vehicles, Communications Electronic Equipment [COMMELE], and weapons), and Class IX (spare parts) are at CENTAG CEGE sites. For future NORTHAG installations, it is highly probable that in addition to the Class IV, VII, and IX items, the Class I (rations), Class III (POL), and Class V (ammunition) items will also be at the sites.

The U.S. Army Logistic Command at Fort Lee, VA, is the Major Command responsible for determining supply and equipment needs and for maintaining up-to-date computer printouts of military-unit-specific quantities. The source of facility information regarding equipment and supplies, amounts, weights, and cubage is the Fort Lee Logistics Center.

## Literature

Many documents contain facility information relevant to CEGE installation planning. The bibliography at the end of this report lists all the literature investigated during this study. The TMs and ARs contain basic operations information, especially TM 38-450 (revised 1978). Information about CEGE facility requirements and criteria on facility eligibility for potential NATO funding are provided in *NATO Criteria and Technical Standards for Construction of Type II Forward Storage Sites (FSTS) (POMCUS)* (1978). Finally, studies by the RAND Corporation and the U.S. Army Engineer Study Center, and Headquarters, Department of Army (HQDA) letter, "Rapid Reinforcement of NATO/Additional POMCUS and FY80 PWRMS" (September 1978), contain important CEGE site concept information related to

installation vulnerability and possible strategic improvements.

Information has been extracted from these sources and integrated into the information provided in Chapter 4.

## User Experience

Since the establishment of the CEGE organization and operation, many military and civilian personnel have gained important experience and knowledge by participating in the receiving, storing, and maintenance activities and in the periodic issue and turn-in activities of REFORGER mobilization exercises. In fact, they have tried many of the alternatives suggested for the problems and uncertainties listed in Chapter 2; for example, both uploading and downloading policies have been attempted. In addition, the CEGE installation personnel familiar with daily operations and the CEGE HQ, 21st SUPCOM, and USAREUR personnel familiar with POMCUS installation policies all possess relevant information that can be useful only if it is integrated meaningfully.

Previous CERL work has developed three information categories for the design and construction of buildings: requirements, criteria, and guidance.<sup>1</sup> Proper use of this information allows the personnel involved in a project to maximize their contributions. Categorization of design information is especially important when several groups separately input, verify, or review facility information. For this CEGE project, the following groups were involved:

### 1. Input information:

- a. User/occupants of CEGE facilities and CEGE HQ staff
- b. Deputy Chief of Staff, Operations (DCSOPS) personnel at USAREUR and 21st SUPCOM

<sup>1</sup> *Concepts for the Generation, Communication, and Evaluation of Habitability Criteria*, Special Report D-78/ADA041187 (U.S. Army Construction Engineering Research Laboratory [CERL], June 1977)

c. Deputy Chief of Staff, Logistics (DCSLOG) personnel at USAREUR and 21st SUPCOM

d. Deputy Chief of Staff Engineer (DCSENGR) and Installation Support Activity, Europe (ISAE) personnel at USAREUR and ACS E&H personnel at 21st SUPCOM

e. EUD personnel (POMCUS project managers)

f. NORTHAG Planning Cell of 21st SUPCOM.

2. Review and verify information:

a. All personnel listed in part 1 above

b. DCSOPS personnel at DA

c. DSCLOG personnel at DA

d. Directorate of Military Programs personnel at OCE.

#### 4 CEGE FACILITY INFORMATION DOCUMENT FORMAT

Three different formats were used to present comprehensive facility information for the user groups:

1. A tabular format presentation of POMCUS-related supply and equipment data from The Army Automated Data System (TAADS) for 81 military units
2. A narrative paragraph format presentation of article information written to improve POMCUS system facilities
3. A categorized, segmented format presentation of specific space information as an integration of document statements and user/occupant input.

Figure 1 is the categorized table of contents for the document; the three information formats are differentiated as:

1. TAADS data (tabular data)

2. Improving POMCUS (narrative paragraphs)

3. Facility design information (segmented, categorized information developed for this project to clearly display functional space information from diverse (and thus possibly conflicting sources).

The page formats of the third section contain seven specific types of information:

1. *Purpose.* This is a statement of overall mission for a specific part of a maintenance or storage facility.

2. *Issues.* This section tells if the functions should be considered for possible design decision trade-offs related to pollution, efficiency, or economy issues.

3. *Assumptions.* These statements of the conditions on which the facility information is based justify the recommendations.

4. *Activities-personnel-equipment.* These state specifically how the functional operations are performed, by whom, and with what equipment.

5. *Requirements.* These are qualitative statements of objectives, written in performance language, that describe a facility's objectives and its technical needs for accommodating the activities/personnel/equipment.

6. *Criteria.* These statements, developed directly from the requirements list, provide the quantitative and/or qualitative means of determining the appropriate design solution for a facility.

7. *Guidance.* These statements, sketches, and diagrams are realistic advice, based on design experience, regarding the appropriate, "optimum" solution.

Figure 2 shows the typical two-page format layout that was developed for presenting excerpts from documents. Figure 3 shows the typical two-page format layout developed for presenting the input of the user/occupants of existing CEGE installations.

As indicated in the list of problems and uncertainties in Chapter 2, conflicting considerations may affect the planning and design of several CEGE installation facilities; these must either be resolved or accommodated before specific project information is developed for PDB submissions. For example, the "NATO Criteria" document (Figure 2) identifies certain facility requirements that are NATO-"PROVIDED" (i.e., possibly NATO-funded), whereas the user input for the same functional space identifies other (or additional) facility requirements considered to be important for continuing operations that should be provided even if NATO funds cannot be used for that portion of the project. The facility design information format was developed so that many sources of information about the same functional space could be integrated into specific design projects, yet still remain distinct to facilitate identification and periodic, separate updating. In the example cited, the PDB could contain the *specific* added requirements so that the *specific* additional project features could be approved and paid for by non-NATO funding. Assigning information from diverse sources to specific categories enables the user to quickly be aware of the inevitable conflicts inherent in any multi-source situation; as a result, constructive accommodations can be made, e.g., application for waivers, finding other funding sources, or making appropriate design trade-off compromises.

## 5 SUMMARY AND RECOMMENDATIONS

### Summary

This report has discussed the generation of information for personnel who will be designing and constructing future CEGE installations. A comprehensive collection of integrated information has been compiled from three sources determined to be relevant to the decision-making process: (1) supplies and equipment data, (2) Army and Congressional literature, and (3) the experience and knowledge of CEGE personnel. This information, which has been assembled into an information document, has been generated with the goal of providing specific attention to (1) functional requirements for the storage, maintenance, and issue functions of CEGE facilities, (2) military threats and vulnerabilities, (3) NATO construction funding justification provisions, and (4) experience gained from daily CEGE operations. Some limited feedback from Command personnel who reviewed the information appears to confirm that the comprehensive information satisfies this goal.

### Recommendations

The current data contained in the "TAADS data" section of the information document should be completely updated at the end of 1980 because continuing modifications in military unit supply and equipment assignments may significantly alter the areas and cubage currently shown. However, the changes occurring between now and the end of 1980 are considered within a reasonable "margin of error" for matching a specific military unit (or units) to a specific controlled-humidity warehouse.

Newly published articles related to improving POMCUS should be added when they are deemed to be valuable to CEGE installation planning and design decisions. The functional space facility information should be updated annually by reviewing activities, personnel, equipment, facility requirements, and design guidance in terms of the best "state-of-the-art" CEGE operations, especially the mobilization issue process. Such a review would be especially relevant after each RE-FORGER exercise to specifically document the experience gained.

## BIBLIOGRAPHY

The following documents related to POMCUS facility information were used to develop the *Facility Information for Type II Forward Storage Site Facilities* document.

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19. FM 38-74-1, *Direct Support Unit (DSU) Storage Operations* (Department of the Army, 27 June 1977).
20. TC 38-2-2, *Class IX (Repair Parts) Supply System, Supply Operating Procedures, Direct Support Unit Procedures* (has 9 changes) (Department of the Army, March 1971).
21. TC 38-2-3, *Class IX (Repair Parts) Supply System, Supply Operating Procedures, Technical Supply Office Procedures* (has 12 changes) (Department of the Army, March 1971).
22. FM 29-23, *Direct Support Maintenance Operations (Non-Div)* (Department of the Army, 30 June 1976).
23. AR 220-1, *Unit Readiness Reporting* (Department of the Army, 15 June 1978).
24. AR-740-1, *Storage and Supply Activities Operations* (Department of the Army, 23 April 1971).
25. SB-740-1, *Storage and Supply Activities* (Department of the Army, 29 August 1975).

FORM 9

**non-divisional**

**data locator** 6/80

<b>DI</b>	<b>ORGANIZATIONAL AND DIRECT SUPPORT MAINTENANCE FACILITY</b>
<b>17</b>	<b>DESIGN INFORMATION</b>

**PURPOSE**

7.1 A facility to perform Organizational and Direct Support Maintenance on vehicles and equipment stored at the site and used in operations will be PROVIDED. (2)

**ISSUES and ASSUMPTIONS**

7.2

- a) Number and sizes of maintenance facilities depend on the numbers and types of vehicles and equipment served and will be specifically justified in each case. (2)
- b) 5.2 If the primary water supply required to satisfy the above demand is inadequate, or is not available, ground level storage points or open tanks will be PROVIDED. (2)

1. Examination and evaluation of existing structures:

If existing buildings are being considered for reuse as POMCUS facilities it is necessary to analyse the renovation costs against "new construction" costs. Major costs have been required to make existing buildings responsive to POMCUS activities; especially,

- 1) adequate insulation for temperature controlled buildings,
- 2) structural adequacy for lift capacities in maintenance facilities.

**Figure 2.** Two-page format for document extract information.

REQUIREMENTS	CRITERIA
<p>a) 7.2 The facility shall be provided with battery preparation areas with emergency shower and eyewash fountain, tire repair areas, centralized compressed air system, parts storage, lubrication racks, office space, latrines, welding shop, production control offices, locker rooms, shower rooms, and break area. (2)</p> <p>b) 7.2 The Facility shall be provided with overhead cranes and vehicle lifts. (2)</p> <p>c) 7.3 Emergency showers and eyewash are required in the battery room due to the nature of materials being handled and the occasion for severe accidents. (2)</p> <p>d) 7.4 Locker rooms and showers shall be PROVIDED. (2)</p> <p>e) 7.5 Building shall be PROVIDED with mechanical ventilation in the battery shop and a special automatic exhaust for vehicle emission in the working area. (2)</p> <p>f) 7.6 A suitable break area will be PROVIDED. (2)</p>	<p>b) 7.2 The facility shall be PROVIDED with a 14 metric-ton traveling overhead crane, 18.5 metric-ton vehicle lifts. (2)</p>
<b>GUIDANCE</b>	

Figure 2 (cont'd)

DI  
17

OM-1  
TRACKED VEHICLE MAINTENANCE BAYS

function/purpose

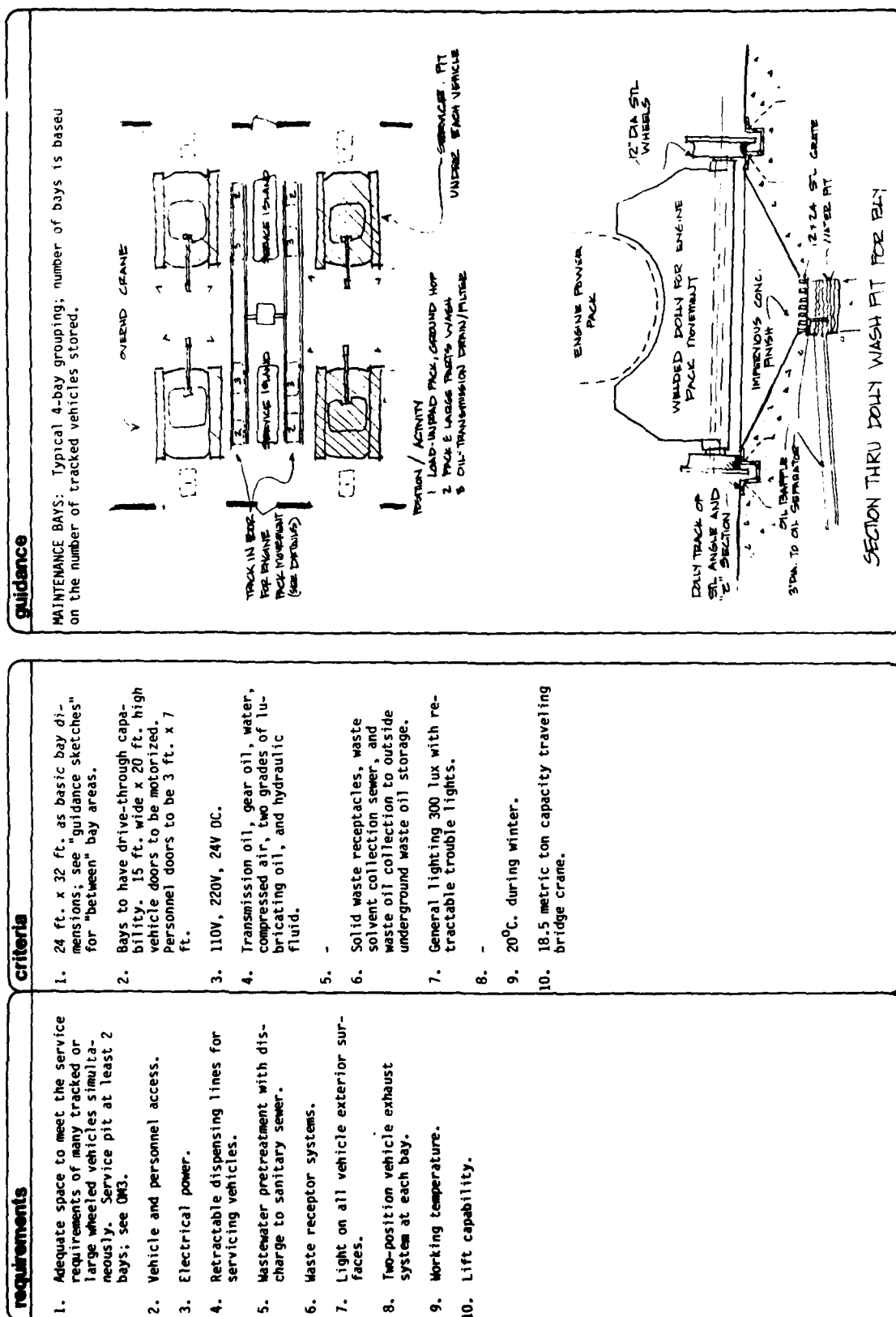
Meet the Scheduled Service Requirements of Tracked-Based TOE Organizational Units. Common SOP requires all tracked vehicles to be cleaned and serviced at regular intervals and some tracked vehicles to be cleaned and serviced after field operations.

issues and assumptions

1. Scheduled maintenance on tactical equipment can be performed more efficiently and provide for positive pollution control if the proper inclosed facilities and equipment are provided.
2. It is desirable to be able to remove crankcase and transmission oils in tracked equipment with either the power pak in or removed from the vehicle.
3. If an "Oil Analysis Program" were universally established for vehicle crankcase oil, facility impacts would be:
  - a. Fewer scheduled maintenance bays would be required.
  - b. There would be less depot-level overhaul of power paks.

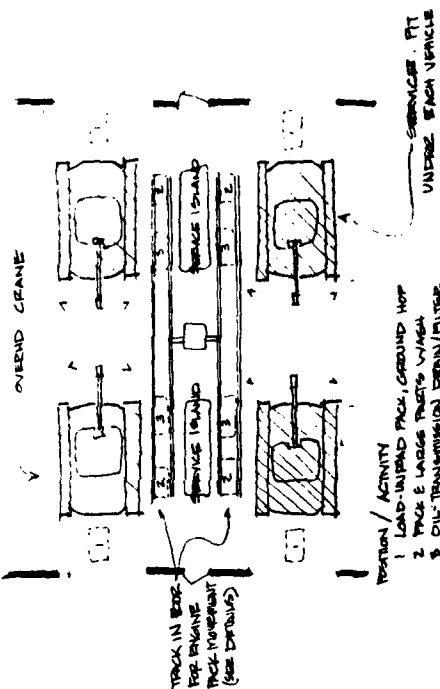
activities	personnel	equipment
<ol style="list-style-type: none"> <li>1. Oil and oil filter changing for wheeled and tracked equipment.</li> <li>2. Fluid level checks.</li> <li>3. Radiator flushing for water-cooled engines.</li> <li>4. Power pak removal.</li> <li>5. Power pak cleaning.</li> <li>6. Hull cleaning.</li> <li>7. Gun tube replacement.</li> <li>8. Gun tube cleaning.</li> <li>9. Tire changing.</li> <li>10. Greasing and lubrication for wheeled and tracked equipment.</li> <li>11. Ground-hopping of tracked equipment.</li> <li>12. Power pak replacement.</li> <li>13. Large component parts cleaning (heatshields, fuel cells, etc.)</li> </ol>	<p>1 to 3 per bay; a function of vehicles scheduled maintenance requirements.</p>	<ol style="list-style-type: none"> <li>1. Movable sliding waste oil collection funnels side-discharging to waste oil collection trough.</li> <li>2. Steam/hot water cleaners.</li> <li>3. Fluid-dispensing system with retractable hoses.</li> <li>4. Floor jacks, either portable or fixed in floor.</li> <li>5. Power pak dollies.</li> <li>6. Solid waste storage cans.</li> <li>7. Recirculating-solvent small parts washer. (See OM7.)</li> </ol>

Figure 3. Two-page format for user/occupant experience information.



### guidance

MAINTENANCE BAYS: Typical 4-bay grouping; number of bays is based on the number of tracked vehicles stored.



### PORTION / ACTIVITY

1. LOAD-UNLOAD PACK, GROUND HOPE
2. PACK & LARGE PACKS WASH
3. OIL-TRANSMISSION OIL/FLUID

SEPARATE PIT UNDER EACH VEHICLE

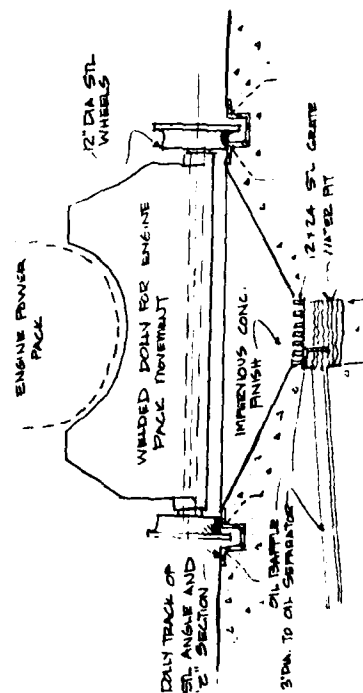


Figure 3 (cont'd).

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